Appendix 1: Space Act Agreement (SAA)

SPACE ACT AGREEMENT NO. NNK11MS01S
BETWEEN
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
AND
SIERRA NEVADA CORPORATION
FOR
COMMERCIAL CREW DEVELOPMENT ROUND 2 (CCDev 2)

BACKGROUND

In 2009, the National Aeronautics and Space Administration ("NASA") began the Commercial Crew Development ("CCDev") initiatives to stimulate efforts within the private sector to develop system concepts and capabilities that could ultimately lead to the availability of commercial human spaceflight services. NASA is continuing that effort through a second round of CCDev initiatives ("CCDev 2") in order to further foster activity leading to the development of orbital commercial Crew Transportation Systems ("CTS"). Through this CCDev 2 activity, NASA may be able to continue to spur economic growth as capabilities for new space markets are created, and reduce the gap in U.S. human spaceflight capability.

The goals of the CCDev 2 investments are to advance orbital commercial CTS concepts and enable significant progress on maturing the design and development of elements of the system, such as launch vehicles and spacecraft, with the overall objective of accelerating the availability of U.S. CTS capabilities while ensuring crew and passenger safety. This Space Act Agreement (the "Agreement" or "SAA") represents Sierra Nevada Corporation's and NASA's commitment to encourage innovations and efficiencies in CTS concepts and capabilities to achieve these CCDev 2 goals. Specifically, the Sierra Nevada Corporation's approach to meeting the goals of the CCDev 2 activity as outlined in Appendix 1.

ARTICLE 1. AUTHORITY

This Agreement is entered into by the National Aeronautics and Space Administration, located at 300 E Street, SW, Washington, D.C. (hereinafter referred to as "NASA" or Government), and Sierra Nevada Corporation, (hereinafter referred to as "SNC" or "Participant") with a place of business at 1722 Boxelder Street; Suite 102; Louisville, Colorado 80027. NASA and SNC may be individually referred to as a "Party" and collectively referred to as the "Parties". NASA's authority to enter into this Agreement is in accordance with the authority set forth in Sections 203(c)(5) and 203(c)(6) of the National Aeronautics and Space Act of 1958, as amended. This

agreement will be implemented by NASA at the John F. Kennedy Space Center in Brevard County, Florida.

ARTICLE 2. PURPOSE

The purpose of this Agreement is to provide financial and limited technical assistance to SNC's advancement of commercial crew space transportation systems concepts. SNC's development work must show, within the timeframe of the Agreement, significant progress in maturing the design and development of elements of a commercial CTS while ensuring crew and passenger safety. SNC will receive payments from NASA upon successful completion of agreed upon milestones as described in Appendix 2 of this Agreement.

ARTICLE 3. RESPONSIBILITIES

A. SNC shall:

(1) Conduct the CCDev 2 effort according to the milestones identified in Appendix 2 to this Agreement.

(2) Lead a quarterly project status briefing.

(3) Designate at least one seat on each review board described in Appendix 2 for a NASA representative.

B. NASA shall:

(1) Provide milestone payments to SNC upon successful completion of each CCDev 2 milestone, subject to limitations noted below.

(2) Participate in the quarterly project status briefing.

(3) Appoint a NASA representative to participate in each review board described in Appendix 2, who shall have concurrence authority on aspects of the space transportation system design, engineering and operations which could affect the ISS or NASA crew members.

ARTICLE 4. SCHEDULE AND MILESTONES

The scheduled major milestones and acceptance criteria for each milestone for the CCDev 2 effort are identified in Appendix 2 to this Agreement.

ARTICLE 5. FINANCIAL OBLIGATIONS AND TECHNICAL REPORTS

A. NASA's Payment Obligation

The Government's liability to make payments to SNC is limited to only those funds obligated under this Agreement or by amendment to the Agreement. NASA may obligate funds to the Agreement incrementally.

B. Acceptance and Payment for Milestones

(1) SNC shall notify the NASA Principal Points of Contact at least 30 calendar days prior to the completion of any milestone to arrange for the NASA Technical Contact or designee to witness the event or accept delivery of documents. NASA shall have 30 calendar days to determine whether the milestone event meets its corresponding acceptance criteria as described in Appendix 2 of this Agreement and shall notify SNC of NASA's acceptance or non-acceptance as soon as such determination is made but in no event later than 30 calendar days from the date that the milestone event was submitted to NASA for review. Disagreement about the successful accomplishment of a milestone shall be deemed a Dispute and resolved in accordance with Article 18 of this Agreement. NASA and SNC agree that time is of the essence for the payment of milestones hereunder with such payment for a successful milestone will occur no later than 30 days after invoice receipt.

(2) SNC shall be able to submit an invoice requesting payment upon the accomplishment and acceptance by NASA of the milestone as identified and described in Appendix 2 of this Agreement. SNC shall submit an invoice via e-mail to the NASA Shared Services Center at NSSC-AccountsPayable@nasa.gov. There shall be no more than one (1) invoice per e-mail submission. After receipt and review of the invoice, the NASA Shared Services Center will coordinate with the NASA Administrative Contact to authorize payment. Subject to change only through written Agreement modification, payment shall be made via electronic funds transfer to the address set forth below:

Bank Account of Payee:
Bank: [redacted]
Address: [redacted]
Routing Transit Number: [redacted]
Depositor Account Title: [redacted]
Depositor Number: [redacted]

(3) The following information shall be included on each invoice:

Agreement Number
Invoice Number
A description of milestone event
Terms of Payment

Payment Office
Agreed Milestone Amount

C. Financial Records and Reports

Except as otherwise provided in this Agreement, SNC's relevant financial records associated with this Agreement are not subject to examination or audit by NASA.

D. Quarterly Project Status Briefings

SNC shall conduct quarterly project status briefings with NASA. Progress made shall be estimated and reported in a mutually agreed to quantifiable performance method. The briefings shall describe the progress made since the last report, plans forward, and shall also describe any difficulties encountered and the corrective action necessary to recover. At each quarterly briefing, SNC will provide NASA with written certification that it has not provided U.S. Government funding to any Russian entity in the previous quarter. "Russian entity," for purposes of this Agreement, is defined in Article 25. The final briefing shall describe not only work completed but also shall document how this activity has reduced the overall risk to SNC's commercial crew space transportation concept and shall also document the way in which lessons learned as the result of these activities are being incorporated into the design and manufacturing efforts of SNC commercial crew space transportation concept.

E. Access to Records

The Comptroller General of the United States, at its discretion and subject to applicable laws and policies, shall have access to and the right to examine records of any Party to the Agreement or any entity that participates in the performance of this Agreement that directly pertain to and involve transactions relating to the Agreement for a period of three (3) years after the Government makes the final payment under this Agreement. This paragraph only applies to any record that is created or maintained in the ordinary course of business or pursuant to a provision of law. The terms of this paragraph shall be included in arrangements in excess of $5,000,000.00, which SNC has entered into for the execution of the milestone events in this Agreement.

ARTICLE 6. DISSEMINATION OF PUBLIC INFORMATION

A. NASA or SNC may, consistent with Federal law and this Agreement, release general information regarding its participation in this Agreement as desired.

B. SNC agrees the words "National Aeronautics and Space Administration" or the letters "NASA" will not be used in connection with a product or service in a manner reasonably calculated to convey any impression that such product or service has the authorization,

support, sponsorship, or endorsement of NASA, which does not, in fact, exist. In addition, with the exception of release of general information in accordance with paragraph A above, SNC agrees that any proposed public use of the NASA name or initials shall be submitted by SNC in advance to the NASA Administrative Contact, who will submit the proposed use to the NASA Assistant Administrator for Public Affairs or designee ("NASA Public Affairs") for review and approval. NASA approval shall be based on applicable law and policy governing the use of the NASA name and initials. Such approval shall not be unreasonably withheld. Use of NASA emblems/devices (i.e., NASA Seal, NASA Insignia, NASA logotype, NASA Program Identifiers, and the NASA Flag) is governed by 14 C.F.R. Part 1221. SNC agrees that any proposed use of such emblems/devices shall be submitted in advance to the NASA Administrative Contact, who will submit the proposed use to NASA Public Affairs for review and approval in accordance with such regulations.

C. NASA does not endorse or sponsor any commercial product, service, or activity. NASA's participation in this Agreement does not constitute endorsement by NASA. SNC agrees that nothing in this Agreement will be construed to imply that NASA authorizes, supports, endorses, or sponsors any product or service of SNC resulting from activities conducted under this Agreement.

ARTICLE 7. NASA FURNISHED INFORMATION AND SERVICES

A. NASA may, at its sole discretion and on terms to be negotiated between the Parties, provide SNC services, technical expertise, or access to Government Property. Such NASA services, technical expertise, or access to Government Property may be provided on either a reimbursable or non-reimbursable basis. Specific services and property and any terms and conditions applicable to the provision of such services, technical expertise and access to Government property will be identified in appropriate appendices to this Agreement. Unless NASA specifically requires SNC to use NASA furnished services, technical expertise, or Government Property to fulfill its obligations under this Agreement, any decision by SNC to use NASA furnished services, technical expertise, or Government Property shall be at SNC's discretion. SNC shall remain solely responsible for completion of its milestones under this Agreement regardless of the availability or use of NASA services, technical expertise, or Government Property.

B. SNC may enter into separate Space Act agreements with NASA Centers to use NASA resources in performance of this Agreement. The terms and conditions of such other Space Act agreements will govern the use of NASA resources not being provided under this Agreement. SNC will be responsible for ensuring timely, accurate work of its team, including any NASA Centers, and, if necessary, replacing such subcontractors/partners in order to meet milestones.

ARTICLE 8. NONEXCLUSIVITY

This Agreement is not exclusive; accordingly, NASA may enter into similar Agreements for the same or similar purpose with other entities.

ARTICLE 9: PARTICIPANT CERTIFICATIONS

Within 10 calendar days of the effective date of this agreement, and within 10 calendar days of any change in status under A. through D. below (including the addition of any new contractor/partner), SNC shall certify to the best of its knowledge and belief the following to the NASA Administrative Contact:

A. Neither SNC nor any of its contractors/partners are presently debarred, suspended, proposed for debarment, or otherwise declared ineligible for award of funding by any Federal agency.

B. Neither SNC nor any of its contractors/partners have been convicted nor had a civil judgment rendered against it within the last three (3) years for fraud in obtaining, attempting to obtain, or performing a Government contract.

C. SNC or any of its contractors/partners receiving $100,000 or more in NASA funding for work performed under this Agreement must certify that they have not used any such funds for lobbying purposes prohibited by 31 U.S.C. 1352.

D. SNC is an eligible participant as defined in Section 4.2 of the CCDev 2 Announcement.

ARTICLE 10. LIABILITY AND RISK OF LOSS

A. SNC hereby waives any claims against NASA, its employees, its related entities, (including, but not limited to, contractors and subcontractors at any tier, grantees, investigators, customers, users, and their contractors and subcontractors, at any tier) and employees of NASA's related entities for any injury to, or death of, SNC employees or the employees of SNC's related entities, or for damage to, or loss of, SNC's property or the property of its related entities arising from or related to activities conducted under this Agreement, whether such injury, death, damage, or loss arises through negligence or otherwise, except in the case of willful misconduct.

B. SNC further agrees to extend this unilateral waiver to its related entities by requiring them, by contract or otherwise, to waive all claims against NASA, its related entities, and employees of NASA and employees of NASA's related entities for injury, death, damage, or loss arising from or related to activities conducted under this Agreement.

ARTICLE 11. LIMITATION ON PAYMENTS TO INFLUENCE CERTAIN FEDERAL TRANSACTIONS

SNC or its contractors/partners shall not use any funds provided under this Agreement to pay any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with any of the following covered Federal actions: the awarding of any Federal contract; the making of any Federal grant; the making of any Federal loan; the entering into of any cooperative agreement; or the modification of any Federal contract, grant, loan, or cooperative agreement.

ARTICLE 12. INTELLECTUAL PROPERTY AND DATA RIGHTS - RIGHTS IN DATA

A. General

(1) "Related Entity" as used in this Article, means a contractor, subcontractor, grantee, or other entity having a legal relationship with NASA or SNC that is assigned, tasked, or contracted with to perform specified NASA or SNC activities under this Agreement.

(2) "Data," as used in this Agreement, means recorded information, regardless of form, the media on which it may be recorded, or the method of recording. The term includes, but is not limited to, data of a scientific or technical nature, software and documentation thereof, and data comprising commercial and financial information.

(3) "Proprietary Data," as used in this Article, means Data embodying trade secrets or comprising commercial or financial information that is privileged or confidential.

(4) The Data rights set forth herein are applicable to employees of SNC and employees of any Related Entity of SNC. SNC shall ensure that its employees and employees of any Related Entity that perform SNC activities under this Agreement are aware of the obligations under this Article and that all such employees are bound to such obligations.

(5) Data exchanged between NASA and SNC under this Agreement will be exchanged without restriction as to its disclosure, use, or duplication except as otherwise provided in this Article.

(6) No preexisting Proprietary Data will be exchanged between the Parties under this Agreement unless specifically authorized in this Article or in writing by the owner of the Proprietary Data.

(7) In the event that Data exchanged between NASA and SNC include a restrictive notice that NASA or SNC deems to be ambiguous or unauthorized, NASA or SNC may inform the other Party of such condition. Notwithstanding such a notice, as long as such notice provides an indication that a restriction on use or disclosure was intended, the Party receiving such Data will treat the Data pursuant to the requirements of this clause unless otherwise directed in writing by the party providing such Data.

(8) Notwithstanding any restriction on use, disclosure, or reproduction of Data provided in this clause, the Parties will not be restricted in the use, disclosure, or reproduction of Data provided under this Agreement that: (a) is publicly available at the time of disclosure or

thereafter becomes publicly available without breach of this Agreement; (b) is known to, in the possession of, or developed by the receiving Party independent of carrying out the receiving Party's responsibilities under this Agreement and independent of any disclosure of, or without reference to, Proprietary Data or otherwise protectable Data hereunder; (c) is received from a third party having the right to disclose such information without restriction; or (d) is required to be produced or released by the receiving Party pursuant to a court order or other legal requirement.

(9) If either NASA or SNC believes that any of the events or conditions that remove restriction on the use, disclosure, or reproduction of the Data apply, NASA or SNC will promptly notify the other Party of such belief prior to acting on such belief, and, in any event, will notify the other Party prior to an unrestricted use, disclosure, or reproduction of such Data.

(10) Disclaimer of Liability: Notwithstanding any restriction on use, disclosure, or reproduction of Data provided in this Article, NASA will not be restricted in, nor incur any liability for, the use, disclosure, or reproduction of any Data not identified with a suitable restrictive notice in accordance with paragraphs B and G of this Article or of any Data included in Data which SNC has furnished, or is required to furnish to the U.S. Government without restriction on disclosure and use.

(11) SNC may use the following, or a similar, restrictive notice as required by paragraphs B and G of this Article. In addition to identifying Proprietary Data with such a restrictive notice, SNC should mark each page containing Proprietary Data with the following, or a similar, legend: "PROPRIETARY DATA – use and disclose only in accordance with notice on title or cover page."

Proprietary Data Notice

These data herein include <*enter as applicable*: "Background Data" or "Data Produced by SNC under a Space Act Agreement"> in accordance with the Data Rights provisions under Space Act Agreement <*provide applicable identifying information*> and embody Proprietary Data. In accordance with the Space Act Agreement, NASA will use reasonable efforts to maintain the data in confidence and limit use, disclosure, and reproduction by NASA and any Related Entity of NASA (under suitable protective conditions) in accordance with restrictions identified in the Space Act Agreement <*may list specific restrictions listed in the Agreement*>.

B. Data First Produced by SNC under this Agreement

(1) Data first produced by SNC in carrying out SNC's responsibilities under this Agreement, including but not limited to technical data related to inventions made under this Agreement, will be furnished to NASA upon request and such Data will be disclosed and used by NASA and any Related Entity of NASA (under suitable protective conditions) during the term of this Agreement only for evaluating SNC's performance under this Agreement. If SNC considers any such Data to be Proprietary Data, and such Data is identified with a suitable restrictive notice, NASA will use reasonable efforts to maintain the Data in confidence.

(2) Upon a successful completion by SNC of all milestones under this Agreement, NASA shall not assert rights in such Data or use such Data for any purpose except that NASA shall retain the right to: (1) maintain a copy of such Data for archival purposes; and (2) use or

disclose such archived Data by or on behalf of NASA for Government purposes in the event the NASA determines that

(a) Such action is necessary because SNC, its assignee, or other successor has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of inventions, hardware, or software related to such Data;

(b) Such action is necessary because SNC, its assignee, or other successor, having achieved practical application of inventions, hardware, or software related to such Data, has failed to maintain practical application;

(c) Such action is necessary because SNC, its assignee, or other successor has discontinued making the benefits of inventions, hardware, or software related to such Data available to the public or to the Federal Government;

(d) Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by SNC, its assignee, or other successor; or

(e) Such action is necessary to meet requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by SNC, its assignee, or successor.

In the event NASA determines that one of the circumstances listed in subparagraphs (a)–(e) above exists, NASA shall provide written notification to the SNC Administrative Point of Contact. Upon mailing of such determination, SNC shall have thirty (30) days to respond by providing its objection to the determination as a dispute under the Article entitled "Dispute Resolution" of this Agreement. In the event that SNC does not respond in writing to NASA's determination, then such determination shall serve as a final agency decision for all purposes including judicial review.

(3) In the event NASA terminates this Agreement in accordance with Article 16.B., Termination for Failure to Perform, NASA shall have the right to use, reproduce, prepare derivative works, distribute to the public, perform publicly, display publicly, or disclose Data first produced by SNC in carrying out SNC's responsibilities under this Agreement by or on behalf of NASA for Government purposes.

(4) The parties will negotiate rights in Data in the event of termination for any other reason.

C. Data First Produced by NASA under this Agreement

(1) As to Data first produced by NASA (or any Related Entity of NASA) in carrying out NASA responsibilities under this Agreement that would be Proprietary Data if it had been obtained from SNC, such Data will be appropriately marked with a restrictive notice and maintained in confidence for the duration of this Agreement, with the express understanding that during the aforesaid restricted period such marked Data may be disclosed and used by NASA and any Related Entity of NASA (under suitable protective conditions) only for carrying out NASA responsibilities under this Agreement.

(2) Upon a successful completion by SNC of all milestones under this Agreement, NASA shall not use such Data for any purpose except that NASA shall retain the right to: (1) maintain and reproduce copies of such Data for archival purposes; and (2) use or disclose such archived Data by or behalf of the NASA for Government purposes in the event the NASA determines that

(a) Such action is necessary because SNC, its assignee, or other successor has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of inventions, hardware, or software related to such Data;

(b) Such action is necessary because SNC, its assignee, or other successor, having achieved practical application of inventions, hardware, or software related to such Data, has failed to maintain practical application;

(c) Such action is necessary because SNC, its assignee, or other successor has discontinued making the benefits of inventions, hardware, or software related to such Data available to the public or to the Federal Government;

(d) Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by SNC, its assignee, or other successor; or

(e) Such action is necessary to meet requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by SNC, its assignee, or successor.

In the event NASA determines that one of the circumstances listed in subparagraphs (a)–(e) above exists, NASA shall provide written notification to the SNC Administrative Point of Contact. Upon mailing of such determination, SNC shall have thirty (30) days to respond by providing its objection to the determination as a dispute under the Article entitled "Dispute Resolution" of this Agreement. In the event that SNC does not respond in writing to NASA's determination, then such determination shall serve as a final agency decision for all purposes including judicial review.

(3) In the event NASA terminates this Agreement in accordance with Article 16.B., Termination for Failure to Perform, NASA shall have the right to use, reproduce, prepare derivative works, distribute to the public, perform publicly, display publicly, or disclose Data first produced by NASA in carrying out NASA's responsibilities under this Agreement by or on behalf of NASA for Government purposes.

(4) The parties will negotiate rights in Data in the event of termination for any other reason.

D. Publication of Results

(1) Recognizing that section 203 of the National Aeronautics and Space Act of 1958 (42 U.S.C. § 2473), as amended, requires NASA to provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof, and that the dissemination of the results of NASA activities is one of the considerations for this Agreement, NASA will coordinate proposed publication of results with SNC in a manner that allows SNC a reasonable amount of time to review and comment on proposed publications.

(2) Consistent with other obligations in this Article, NASA agrees that it will not publish any results without first receiving permission from SNC.

E. Data Disclosing an Invention

In the event Data exchanged between NASA and SNC discloses an invention for which patent protection is being considered, the furnishing party specifically identifies such Data, and the

disclosure and use of such Data is not otherwise limited or restricted herein, the receiving party agrees to withhold such Data from public disclosure for a reasonable time (presumed to be 1 year unless mutually agreed otherwise) in order for patent protection to be obtained.

F. Data Subject to Export Control

Technical data, whether or not specifically identified or marked, that is subject to the export laws and regulations of the United States and that is provided to SNC under this Agreement will be treated as such, and will not be further provided to any foreign persons or transmitted outside the United States without proper U.S. Government authorization, where required.

G. Background Data

(1) In the event SNC furnishes NASA with Data developed at private expense that existed prior to, or was produced outside of, this Agreement, and such Data embody Proprietary Data, and such Data is so identified with a suitable restrictive notice, NASA will use reasonable efforts to maintain the Data in confidence and such Data will be disclosed and used by NASA and any Related Entity of NASA (under suitable protective conditions) only for evaluating SNC's performance under this Agreement. Upon completion of activities under this Agreement, such Data will be disposed of as requested by SNC.

(2) At the time of execution of this Agreement, the Parties agree that the Background Data identified in Appendix 3 embodies Proprietary Data that will be provided to NASA.

H. Handling of Data

(1) In the performance of this Agreement, SNC and any Related Entity of SNC may have access to, be furnished with, or use the following categories of Data:

(a) Proprietary Data of third parties that the U.S. Government has agreed to handle under protective arrangements; and/or

(b) U.S. Government Data, the use and dissemination of which, the U.S. Government intends to control.

(2) Data provided by the U.S. Government under the Agreement

(a) The Parties agree that, during the term of this Agreement, SNC may request from NASA, and NASA may provide, Proprietary Data of third parties, with the express understanding that SNC will use and protect such Data in accordance with this Article.

(b) The Parties agree that, during the term of this Agreement, SNC may request from NASA, and NASA may provide, U.S. Government Data, with the express understanding that SNC will use and protect such U.S. Government Data in accordance with this Article.

(c) At the time of execution of this Agreement, the Parties agree that the following software and related Data will be provided to SNC, to the extent NASA has determined it has the right to distribute, under a separate Software Usage Agreement with the express understanding that SNC will use and protect such related Data in accordance with this Article: <*None*>. Unless SNC has entered into a license, consistent with 37 C.F.R. Part 404, for software provided under this Agreement, upon completion of activities under this Agreement, such

related Data will be disposed of as instructed by NASA. Note: From time to time during the term of this Agreement, SNC may request from NASA, and NASA may provide, such software and related data.

(3) With respect to such Data specifically identified in this Agreement or specifically marked with a restrictive notice, SNC agrees to:

(a) Use, disclose, or reproduce such Data only to the extent necessary to perform the work required under this Agreement;

(b) Safeguard such Data from unauthorized use and disclosure;

(c) Allow access to such Data only to its employees and any Related Entity that require access for their performance under this Agreement;

(d) Except as otherwise indicated in (3)(c) above, preclude access and disclosure of such Data outside SNC's organization;

(e) Notify its employees who may require access to such Data about the obligations under this Article, and ensure any Related Entity performs the same functions with respect to its employees; and

(f) Return or dispose of such Data, as NASA may direct, when the Data is no longer needed for performance under this Agreement.

I. Oral and visual information

If information that SNC considers to be Proprietary Data is disclosed orally or visually to NASA, NASA will have no duty to limit or restrict, and will not incur any liability for, any disclosure or use of such information unless (1) SNC orally informs NASA before initial disclosure that such information is considered to be Proprietary Data, and (2) SNC reduces such information to tangible, recorded form that is identified and marked with a suitable restrictive notice as required by paragraphs B and G above and furnishes the resulting Data to NASA within 10 calendar days after such oral or visual disclosure.

ARTICLE 13. INTELLECTUAL PROPERTY AND DATA RIGHTS - INVENTION AND PATENT RIGHTS

A. Definitions

(1) "Administrator," as used in this Article, means the Administrator of the National Aeronautics and Space Administration (NASA) or duly authorized representative.

(2) "Patent Representative" as used in this Article means the NASA Kennedy Space Center Patent Counsel. Correspondence with the Patent Representative under this clause will be sent to the address below:

Patent Counsel
Mail Code CC-A
Office of the Chief Counsel
NASA John F. Kennedy Space Center, FL 32899

(3) "Invention," as used in this Agreement, means any innovation or discovery that is or may be patentable or otherwise protectable under title 35 of the U.S.C.

(4) "Made," as used in relation to any invention, means the conception or first actual reduction to practice of such invention.

(5) "Practical application," as used in this Agreement, means to manufacture, in the case of a composition or product; to practice, in the case of a process or method; or to operate, in case of a machine or system; and, in each case, under such conditions as to establish that the invention, hardware, software, or related Data is being utilized and that its benefits are, to the extent permitted by law or Government regulations, available to the public or to the Federal Government on reasonable terms.

(6) "Related Entity" as used in this Article, means a contractor, subcontractor, grantee, or other entity having a legal relationship with NASA or SNC that is assigned, tasked, or contracted with to perform specified NASA or SNC activities under this Agreement.

B. Allocation of principal rights

(1) Presumption of title

(a) Any invention made under this Agreement shall be presumed to have been made in the manner specified in paragraph (1) or (2) of section 305(a) (42 U.S.C. § 2457(a)) of the National Aeronautics and Space Act of 1958 (hereinafter called "the Act"), and the above presumption shall be conclusive unless at the time of reporting such invention SNC submits to the Patent Representative a written statement, containing supporting details, demonstrating that the invention was not made in the manner specified in paragraph (1) or (2) of section 305(a) of the Act.

(b) Regardless of whether title to such an invention would otherwise be subject to an advance waiver or is the subject of a petition for waiver as described in paragraph B.(3) and paragraph I, SNC may nevertheless file the statement described in paragraph B.(1)(a) of this Article. The Administrator (or his designee) will review the information furnished by SNC in any such statement and any other available information relating to the circumstances surrounding the making of the invention and will notify SNC whether the Administrator has determined that the invention was made in the manner specified in paragraph (1) or (2) of section 305(a) of the Act.

(2) Property rights in inventions. Each invention made under this Agreement for which the presumption of paragraph B.(1)(a) of this clause is conclusive or for which there has been a determination that it was made in the manner specified in paragraph (1) or (2) of section 305(a) of the Act shall be the exclusive property of the United States as represented by the Administrator of NASA unless the Administrator waives all or any part of the rights of the United States to SNC's invention, as provided in paragraph B.(3) of this clause.

(3) Waiver of rights.

(a) The NASA Patent Waiver Regulations, 14 C.F.R. Part 1245, Subpart 1, have adopted the Presidential Memorandum on Government Patent Policy of February 18, 1983, as a guide in acting on petitions (requests) for waiver of rights to any invention or class of inventions made or that may be made in the manner specified in paragraph (1) or (2) of Section 305(a) of the Act.

(b) NASA has determined that to stimulate and support the capability of a United States commercial provider to provide commercial crew space transportation services to the public and the Federal Government, the interest of the United States would be served by waiving to SNC, in accordance with provisions of 14 C.F.R. Part 1245, Subpart 1, rights to inventions made by SNC in the performance of work under this Agreement. Therefore, upon petition submitted by SNC, as provided in 14 C.F.R. Part 1245, Subpart 1, either prior to execution of the Agreement or within 30 calendar days after execution of the Agreement, for advance waiver of rights to any or all of the inventions that may be made under this Agreement, NASA will waive such rights to SNC. If such a petition is not submitted, SNC may petition for waiver of rights to an identified invention within eight months of first disclosure of invention in accordance with paragraph E.(2) of this clause or within such longer period as may be authorized in accordance with 14 CFR 1245.105. Further procedures are provided in paragraph I of this clause.

C. Minimum rights reserved by the Government

(1) With respect to each SNC invention made under this Agreement for which a waiver of rights is applicable in accordance with 14 C.F.R. Part 1245, Subpart 1, the Government reserves:

(a) An irrevocable, royalty-free license for the practice of such invention throughout the world by or on behalf of the United States or any foreign government in accordance with any treaty or agreement with the United States; and

(b) Such other March-in rights as given in Paragraph H below.

(2) NASA will not exercise the government purpose license reserved in paragraph C.(1)(a) during the term of this Agreement.

(3) Upon a successful completion by SNC of all milestones under this Agreement, NASA will refrain from exercising the government purpose license reserved in paragraph C.(1)(a) for a period of five (5) years following the expiration of this Agreement or until December 31, 2015, whichever is later.

(4) Nothing contained in this paragraph shall be considered to grant to the Government any rights with respect to any invention other than an invention made under this Agreement.

D. Minimum rights to SNC

(1) SNC is hereby granted a revocable, nonexclusive, royalty-free license in each patent application filed in any country on an invention made by SNC under this Agreement and any resulting patent in which the Government acquires title, unless SNC fails to disclose such invention within the times specified in paragraph E.(2) of this clause. SNC 's license extends to its domestic subsidiaries and affiliates, if any, within the corporate structure of which SNC is a party and includes the right to grant sublicenses of the same scope to the extent SNC was legally obligated to do so at the time the Agreement was awarded. The license is transferable only with the approval of the Administrator except when transferred to the successor of that part of SNC's business to which the invention pertains.

(2) SNC 's domestic license may be revoked or modified by the Administrator to the extent necessary to achieve expeditious practical application of such invention pursuant to an application for an exclusive license submitted in accordance with 37 C.F.R. Part 404, Licensing

of Government Owned Inventions. This license will not be revoked in that field of use or the geographical areas in which SNC has achieved practical application and continues to make the benefits of the invention reasonably accessible to the public. The license in any foreign country may be revoked or modified at the discretion of the Administrator to the extent SNC, its licensees, or its domestic subsidiaries or affiliates have failed to achieve practical application in that foreign country.

(3) Before revocation or modification of the license, SNC will be provided a written notice of the Administrator's intention to revoke or modify the license, and SNC will be allowed 30 calendar days (or such other time as may be authorized by the Administrator for good cause shown by SNC) after the notice to show cause why the license should not be revoked or modified. SNC has the right to appeal, in accordance with 14 C.F.R. 1245.112, any decision concerning the revocation or modification of its license.

E. Invention identification, disclosures, and reports

(1) SNC shall establish and maintain active and effective procedures to assure that inventions made under this Agreement are promptly identified and disclosed to SNC personnel responsible for the administration of this clause within six months of conception and/or first actual reduction to practice, whichever occurs first in the performance of work under this Agreement. These procedures shall include the maintenance of laboratory notebooks or equivalent records and other records as are reasonably necessary to document the conception and/or the first actual reduction to practice of such inventions, and records that show that the procedures for identifying and disclosing such inventions are followed. Upon request, SNC shall furnish the Patent Representative a description of such procedures for evaluation and for determination as to their effectiveness.

(2) SNC will disclose each such invention to the Patent Representative within two months after the inventor discloses it in writing to SNC personnel responsible for the administration of this clause or, if earlier, within six months after SNC becomes aware that such an invention has been made, but in any event before any on sale, public use, or publication of such invention known to SNC. SNC shall use the NASA electronic New Technology Reporting system (eNTRe), accessible at http://invention.nasa.gov, to disclose inventions. The invention disclosure shall identify this Agreement and shall be sufficiently complete in technical detail to convey a clear understanding, to the extent known at the time of the disclosure, of the nature, purpose, operation, and physical, chemical, biological, or electrical characteristics of the invention. The disclosure shall also identify any publication, on sale, or public use of any such invention and whether a manuscript describing such invention has been submitted for publication and, if so, whether it has been accepted for publication at the time of disclosure. In addition, after disclosure to NASA, SNC will promptly notify NASA of the acceptance of any manuscript describing such an invention for publication or of any on sale or public use planned by SNC for such invention.

(3) SNC shall furnish the Patent Representative the following:

(a) Interim reports every 12 months (or such longer period as may be specified by the Patent Representative) from the date of the Agreement, listing inventions made under this Agreement during that period, and certifying that all such inventions have been disclosed (or

that there are no such inventions) and that the procedures required by paragraph E.(2) of this clause have been followed.

(b) A final report, within three months after completion of the work, listing all inventions made under this Agreement or certifying that there were no such inventions, and listing all subcontracts or other agreements with a Related Entity containing a patent and invention rights clause (as required under paragraph G of this clause) or certifying that there were no such subcontracts or other agreements.

(c) Interim and final reports shall be submitted electronically at the eNTRe Web-site http://invention.nasa.gov.

(4) SNC agrees, upon written request of the Patent Representative, to furnish additional technical and other information available to SNC as is necessary for the preparation of a patent application on an invention made under this Agreement in which the Government retains title and for the prosecution of the patent application, and to execute all papers necessary to file patent applications on such inventions and to establish the Government's rights in the inventions.

(5) Protection of reported inventions. When inventions made under this Agreement are reported and disclosed to NASA in accordance with the provisions of this Article, NASA agrees to withhold such reports or disclosures from public access for a reasonable time (presumed to be 1 year unless otherwise mutually agreed) in order to facilitate the allocation and establishment of the invention and patent rights under these provisions.

F. Examination of records relating to inventions

(1) The Patent Representative or designee shall have the right to examine any books (including laboratory notebooks), records, and documents of SNC relating to the conception or first actual reduction to practice of inventions in the same field of technology as the work under this Agreement to determine whether

(a) Any such inventions were made in performance of this Agreement;

(b) SNC has established and maintained the procedures required by paragraph E.(1) of this clause; and

(c) SNC and its inventors have complied with the procedures.

(2) If the Patent Representative learns of an unreported SNC invention that the Patent Representative believes may have been made under this Agreement, SNC may be required to disclose the invention to NASA for a determination of ownership rights.

(3) Any examination of records under this paragraph will be subject to appropriate conditions to protect the confidentiality of the information involved.

G. Subcontracts or Other Agreements

(1)(a) Unless otherwise authorized or directed by the Patent Representative, SNC shall include this *Invention and Patent Rights* Article (suitably modified to identify the parties) in any subcontract or other agreement with a Related Entity hereunder (regardless of tier) for the performance of experimental, developmental, or research work.

(b) In the *Invention and Patent Rights* Article included in any such subcontract or other agreement, the following (suitably modified to identify the parties) shall be substituted for paragraph B(3)(b):

> As provided in 14 C.F.R. Part 1245, Subpart 1, [insert name of Related Entity] may petition, either prior to execution of the Agreement or within 30 calendar days after execution of the Agreement, for advance waiver of rights to any or all of the inventions that may be made under this Agreement. If such a petition is not submitted, or if after submission it is denied, [insert name of Related Entity] may petition for waiver of rights to an identified invention within eight months of first disclosure of invention in accordance with paragraph E.(2) of this Article or within such longer period as may be authorized in accordance with 14 CFR 1245.105. Further procedures are provided in paragraph H of this Article.

(c) In the case of subcontracts or other agreements at any tier, NASA, the Related Entity, and SNC agree that the mutual obligations of the parties created by this Article constitute privity of contract between the Related Entity and NASA with respect to those matters covered by this Article.

(2) In the event of a refusal by a prospective Related Entity to accept such a clause, SNC:

(a) Shall promptly submit a written notice to the Patent Representative setting forth the prospective Related Entity's reasons for such refusal and other pertinent information that may expedite disposition of the matter; and

(b) Shall not proceed with such subcontract or other agreement without the written authorization of the Patent Representative.

(3) SNC shall promptly notify the Patent Representative in writing upon the award of any subcontract or other agreement with a Related Entity (at any tier) containing an invention and patent rights clause by identifying the Related Entity, the applicable invention and patent rights clause, the work to be performed under the subcontract or other agreement, and the dates of award and estimated completion. Upon request of the Patent Representative, SNC shall furnish a copy of such subcontract or other agreement, and, no more frequently than annually, a listing of the subcontracts or other agreements that have been awarded.

(4) In recognition of SNC's substantial contribution of funds, facilities and/or equipment to the work performed under this Agreement, SNC is authorized, subject to the rights of NASA set forth elsewhere in this Article, to:

(a) Acquire by negotiation and mutual agreement rights to an invention made under this Agreement by a Related Entity as SNC may deem necessary to obtaining and maintaining of private support; and

(b) Request, in the event of an inability to reach agreement pursuant to paragraph G.(4)(a) of this Article, that NASA request that such rights for SNC be included as an additional reservation in a waiver granted pursuant to 14 CFR Part 1245, Subpart 1. Any such requests to NASA should be prepared in consideration of the following guidance and submitted to the Patent Representative. Notwithstanding paragraph B.(3)(b) of this Article, the Related Entity should be advised that unless it requests a waiver of title pursuant to the NASA Patent Waiver Regulations (14 C.F.R. Part 1245, Subpart 1), NASA will acquire title to inventions made under this Agreement. If a waiver is not requested or granted, SNC may request a license from NASA

consistent with the requirements of 37 CFR Part 404. A Related Entity requesting a waiver must follow the procedures set forth in paragraph I of this Article.

H. March-in rights

(1) SNC agrees that, with respect to any invention made under this Agreement in which it has acquired title, NASA has the right in accordance with the procedures in 37 CFR 401.6 and any supplemental regulations of the agency to require SNC, or an assignee or exclusive licensee of such an invention, to grant a nonexclusive, partially exclusive, or exclusive license in any field of use to a responsible applicant or applicants, upon terms that are reasonable under the circumstances, and if SNC, its assignee, or exclusive licensee refuses such a request NASA has the right to grant such a license itself if the Federal agency determines that

(a) Such action is necessary because SNC, assignee, or exclusive licensee has not taken, or is not expected to take within a reasonable time, effective steps to achieve practical application of such invention in such field of use;

(b) Such action is necessary because SNC, assignee, or exclusive licensee, having achieved practical application of such invention, has failed to maintain practical application of such invention in such field of use;

(c) Such action is necessary because SNC, assignee, or exclusive licensee has discontinued making the benefits of such invention available to the public or to the Federal Government;

(d) Such action is necessary to alleviate health or safety needs which are not reasonably satisfied by SNC, assignee, or exclusive licensee; or

(e) Such action is necessary to meet requirements for public use specified by Federal regulations and such requirements are not reasonably satisfied by SNC, assignee, or exclusive licensee.

I. Requests for Waiver of Rights

(1) In accordance with the NASA Patent Waiver Regulations, 14 C.F.R. Part 1245, Subpart 1, waiver of rights to any or all inventions made or that may be made under this Agreement may be requested at different time periods. Advance waiver of rights to any or all such inventions may be requested prior to the execution of the Agreement, or within 30 calendar days after execution thereof. In addition, waiver of rights to an identified invention made and reported under this Agreement may be requested, even though a request for an advance waiver was not previously requested or, if previously requested, was not granted.

(2) Each request for waiver of rights shall be by petition to the Administrator and shall include an identification of the petitioner; place of business and address; if petitioner is represented by counsel, the name, address, and telephone number of the counsel; the signature of the petitioner or authorized representative; and the date of signature. No specific forms need be used, but the request should contain a positive statement that waiver of rights is being requested under the NASA Patent Waiver Regulations; a clear indication of whether the request is for an advance waiver or for a waiver of rights for an individual identified invention; whether foreign rights are also requested and, if so, for which countries, and a citation of the

specific section(s) of the regulations under which such rights are requested; and the name, address, and telephone number of the party with whom to communicate when the request is acted upon.

(3) All petitions for waiver, whether advanced or individual petitions, will be submitted to the Patent Representative designated in this Article.

(4) A Petition submitted in advance of this Agreement will be forwarded by the Patent Representative to the Inventions and Contributions Board. The Board will consider the petition and where the Board makes the findings to support the waiver, the Board will recommend to the Administrator that waiver be granted, and will notify the petitioner and the Patent Representative of the Administrator's determination. The Patent Representative will be informed by the Board whenever there is insufficient time or information to permit a decision to be made on an advance waiver without unduly delaying the execution of the Agreement. In the event a request for an advance waiver is not granted or is not decided upon before execution of the Agreement, the petitioner will be so notified by the Patent Representative. All other petitions will be processed by the Patent Representative and forwarded to the Board. The Board shall notify the petitioner of its action and if waiver is granted, the conditions, reservations, and obligations thereof will be included in the Instrument of Waiver. Whenever the Board notifies a petitioner of a recommendation adverse to, or different from, the waiver requested, the petitioner may request reconsideration under procedures set forth in the NASA Patent Waiver Regulations.

ARTICLE 14. DISCLAIMER OF WARRANTY

With the exception of title to inventions made under this Agreement as provided in Article 13, goods (e.g., equipment, facilities, technical information, data, and prototypes) and services, if provided by one Party under this Agreement, are provided “AS IS” and no warranty related to availability, title, or suitability for any particular use, nor any implied warranty of merchantability or fitness for a particular purpose, is provided under this Agreement. Other than title to inventions made under this Agreement as provided in Article 13, both Parties make no express or implied warranty as to any intellectual property, generated information, or product made or developed under this Agreement, or that the goods, services, materials, products, processes, information, or data to be furnished hereunder will accomplish intended results or are safe for any purpose including the intended purpose. Neither Party nor its contractors shall be liable for any direct, general, special, consequential, indirect, or incidental damages attributed to such goods, services, materials, products, processes, information, or data furnished under this Agreement.

ARTICLE 15. TERM OF AGREEMENT

This Agreement becomes effective upon the date of the last signature below and shall remain in effect until the completion of all obligations of both Parties hereto, or two (2) years from the date of the last signature, whichever comes first.

ARTICLE 16. TERMINATION

A. Termination by Mutual Consent

This Agreement may be terminated at any time upon mutual written consent of both Parties.

B. Termination for Failure to Perform

(1) At its discretion, NASA may terminate this Agreement 30 calendar days after issuance of a written notification that SNC has failed to perform under this Agreement, including failure to meet a scheduled milestone as identified and described in Appendix 2. Before making such a notification, NASA will consult with SNC to ascertain the cause of the failure and determine whether additional efforts are in the best interest of the Parties and provide SNC an opportunity period of 60 days to cure such issue. Upon such a notification and determination, NASA will take all rights identified in Articles 12 and 13 of this Agreement.

(2) SNC will not be entitled to any additional payments from the Government due to a termination for failure to meet a milestone. NASA and SNC will negotiate in good faith any other outstanding issues between the Parties. Failure of the Parties to agree will be resolved pursuant to Article 18, Dispute Resolution.

C. Unilateral Termination by NASA

(1) NASA may unilaterally terminate this Agreement upon written notice in the following circumstances: (a) upon a declaration of war by the Congress of the United States; or (b) upon a declaration of a national emergency by the President of the United States; or (c) upon a NASA determination, in writing, that NASA is required to terminate for reasons beyond its control. For purposes of this Article, reasons beyond NASA's control include, but are not limited to, acts of God or of the public enemy, acts of the U.S. Government other than NASA, in either its sovereign or contractual capacity (to include failure of Congress to appropriate sufficient funding), fires, floods, epidemics, quarantine restrictions, strikes, freight embargoes, or unusually severe weather.

(2) Upon receipt of written notification that the Government is unilaterally terminating this Agreement, SNC shall immediately stop work under this Agreement and shall immediately cause any and all of its partners and suppliers to cease work, except to the extent that SNC wishes to pursue the activities defined in Appendix 2 exclusively using its own funding. Upon such a termination, NASA and SNC agree to negotiate in good faith a final settlement payment to be made by NASA. However, in no instance shall NASA’s liability for termination exceed the total amount due under the next milestone of this Agreement and any payment is subject to the provisions of Article 5.

D. Limitation on Damages.

In the event of any termination by NASA, neither NASA nor SNC shall be liable for any loss of profits, revenue, or any indirect or consequential damages incurred by the other Party, its contractors, subcontractors, or customers as a result of any termination of this Agreement. A Party's liability for any damages under this Agreement is limited solely to direct damages, incurred by the other Party, as a result of any termination of this Agreement subject to mitigation of such damages by the complaining party. However, in no instance shall either party's liability for termination exceed the total amount due under the next milestone under this Agreement.

E. Rights in Property.

SNC will have title to property acquired or developed by SNC and its contractors/partners with funding provided under this Agreement, in whole or in part to conduct the activities defined in Appendix 2. In the event of termination of this Agreement as defined in Article 16, Section B, NASA may purchase such property as provided in Article 26 below.

ARTICLE 17. CONTINUING OBLIGATIONS

The obligations of the Parties set forth in the provisions of Article 10 (Liability and Risk of Loss) and Articles 12-13 (Intellectual Property and Data Rights) of this Agreement, and such other rights and obligations which by their terms continue past the expiration or termination of this Agreement, shall so continue to apply.

ARTICLE 18. DISPUTE RESOLUTION

All disputes concerning questions of fact or law arising under this Agreement shall be referred by the claimant in writing to the SNC Administrative Contact and the NASA Administrative Contact, who shall seek to resolve such disputes by mutual agreement. If they are unable to resolve the dispute, then the dispute will be referred to the KSC Commercial Crew Development Program Manager and the SNC Corporate Vice President for joint resolution. If the Parties are still unable to resolve the dispute, the Associate Administrator for Exploration Systems Mission Directorate, or the Deputy of the Directorate, will seek to resolve the dispute, and if necessary issue a written decision that shall be a final Agency decision for all purposes including judicial review.

Pending resolution of any disputes pursuant to this Article, the Parties agree that performance of all obligations shall be pursued diligently in accordance with the direction of the KSC Commercial Crew Development Program Manager.

The Parties agree that this Disputes Resolution procedure shall be the exclusive procedure followed by the Parties in resolving any dispute arising under, or based on, an express or implied provision of this Agreement, including an alleged breach.

ARTICLE 19. PRINCIPAL POINTS OF CONTACT

The following personnel are designated as the Administrative and Technical Contacts between the Parties in the performance of this Agreement.

NASA Administrative Contact
David Shreve
Agreements Officer
John F. Kennedy Space Center
Mail Code: OP
NASA Kennedy Space Center, FL 32899

Phone: 321-867-3456
Fax: 321-867-1166
E-mail: david.shreve@nasa.gov

SNC Corp Administrative Contact
Mark N. Sirangelo,
Corporate Vice President
Sierra Nevada Corporation
1722 Boxelder Street; Suite 102
Louisville, CO 80027

Phone: 720-407-3226
Fax: 303-951-1993
E-mail: mark.sirangelo@sncorp.com

NASA Technical Contact
Scott B. Thurston
Commercial Crew
John F. Kennedy Space Center
Mail Code: FA
NASA Kennedy Space Center, FL 32899

Phone: 321-861-9102
Fax: 321-867-9344
E-mail: scott.b.thurston@nasa.gov

SNC Technical Contact
Jim Voss
Vice President, Space Exploration Systems
Sierra Nevada Corporation
1722 Boxelder Street Suite 102
Louisville, CO 80027

Phone: 720-407-3241
Fax: 303-951-1993
E-mail: jim.voss@sncorp.com

ARTICLE 20. MODIFICATION/AMENDMENTS

All modifications and amendments to this Agreement shall be by mutual agreement of the Parties and shall be executed, in writing, and signed by the signatories to this Agreement, or their respective successor or designee.

ARTICLE 21. ASSIGNMENT OF RIGHTS

Neither this Agreement nor any interest arising under it will be assigned by either Party without the express written consent of the other Party.

ARTICLE 22. ANTI-DEFICIENCY ACT

All activities under or pursuant to this Agreement are subject to the availability of appropriated funds, and no provision shall be interpreted to require obligation or provision of funds in violation of the Anti-Deficiency Act, 31 U.S.C. 1341.

ARTICLE 23. APPLICABLE LAW AND SEVERABILITY

A. U.S. Federal law governs this Agreement for all purposes, including, but not limited to, determining the validity of this Agreement, the meaning of its provisions, and the rights, obligations and remedies of the Parties.

B. If any portion of this Agreement is held invalid by a court of competent jurisdiction, the Parties agree that such invalidity shall not affect the validity of the remaining portions of this Agreement, unless applying such remaining portions would frustrate the purpose of this Agreement.

ARTICLE 24. EXPORT LICENSES

SNC will be responsible for:

A. Compliance with all U.S. export control laws and regulations, including the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120 through 130, and the Export Administration Regulations (EAR), 15 CFR Parts 730 through 799, in the performance of this Agreement. In the absence of available license exemptions/exceptions, SNC will be responsible for obtaining the appropriate licenses or other approvals, if required, for exports of hardware, technical data, and software, or for the provision of technical assistance.

B. Obtaining export licenses, if required, before utilizing foreign persons in the performance of this Agreement, including instances where CCDev 2 efforts are to be performed on-site at NASA Centers, where the foreign person will have access to export-controlled technical data or software.

C. All regulatory record keeping requirements associated with the use of licenses and license exemptions/exceptions.

D. Ensuring that the provisions of this Article apply to its contractors/partners.

In the event that either Party intends to utilize a foreign person (as defined in the ITAR and the EAR) in the performance of this Agreement, such Party shall be responsible for obtaining the required export licenses in advance of the foreign person's participation.

ARTICLE 25. LIMITATIONS ON ACTIVITIES WITH RUSSIAN ENTITIES FOR GOODS OR SERVICES

A. SNC shall not provide funding received under this Agreement in connection with any transaction to purchase goods or services with Russian entities without first receiving written approval from the NASA Administrative Contact. In order to obtain this written approval to engage in such transactions with any Russian entity, SNC shall provide the NASA Administrative Contact with the following information related to each planned transaction:

(1) A detailed description of the Russian entity, including its name, address, and a point of contact, as well as a detailed description of the proposed transaction including the specific purpose of payments that will made under the transaction.

(2) SNC shall provide certification that the Russian entity is not on any of the denied parties, specially designated nationals and entities of concern, lists found at:

BIS's Listing of Entities of Concern: http://www.access.gpo.gov/bis/ear/pdf/744spir.pdf

BIS's List of Denied Parties: http://www.bis.doc.gov/dpl/default.shtm

OFAC's List of Specially Designated Nationals:
http://www.ustreas.gov/offices/enforcement/ofac/sdn/

List of Unverified Persons in Foreign Countries:
http://www.bis.doc.gov/enforcement/unverifiedlist/unverified_parties.html

State Department's List of Parties Statutorily Debarred for Arm Export Control Act Convictions: http://www.pmddtc.state.gov/compliance/debar.html

State Department's List of Proliferating Entities:
http://www.state.gov/t/isn/c15231.htm

B. Unless otherwise agreed by the NASA Administrative Contact, the information necessary to seek approval to enter into any transaction shall be provided to the NASA Administrative Contact 30 calendar days prior to entering into such transaction with any Russian entities.

C. After receiving approval to enter into a requested transaction, SNC shall provide the NASA Administrative Contact with a report not later than 10 calendar days after the end of each calendar quarter which documents the individual payments made to such Russian entity.

D. For the purpose of this Article 25, the term "Russian entities" includes the following:

(1) Russian persons, or

(2) Entities created under Russian law (including any organization, entity, or element of the Government of the Russian Federation) or owned, in whole or in part, by Russian persons or companies.

ARTICLE 26. TITLE AND RIGHTS IN PROPERTY

SNC will have title to tangible personal property acquired or developed under this Agreement, including developed or acquired by SNC for CCDev 2 efforts. In the event of termination of this Agreement as defined in Article 16, Section B, NASA will have the right to purchase any such property. The Parties will negotiate in good faith purchase prices for specific items of property.

ARTICLE 27. OPTIONAL MILESTONE AUTHORIZATION

Milestones listed in Appendix 2(a), Performance Milestones and Success Criteria, form the initial negotiated and awarded effort under this Agreement. Milestones in Appendix 2(b) are optional Performance Milestones related to SNC's crew transportation development effort. These optional milestones include notional funding amounts and create no obligation for either party to perform unless specific separate investment and authorization is provided by the Government. If, during the period of performance of this SAA, the Government wishes to add any of the identified optional Performance Milestones, NASA will provide written notification of this intention to SNC. This notification will be provided by the Associate Administrator for Exploration Systems or his designee. The parties will negotiate in good faith a milestone funding amount not to exceed the amount and milestone completion date listed for that milestone in Appendix 2(b). Final awarded milestone amounts will be based on and are subject to the availability of funds.

ARTICLE 28. SIGNATURE BLOCK

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

BY: Philip R. McAlister

Philip McAlister
Special Assistant to the Associate Administrator for Exploration Systems

DATE: 4/18/2011

SIERRA NEVADA CORPORATION

BY: Mark N. Sirangelo

Mark N. Sirangelo
Corporate Vice President

DATE:

Attachment 1: Executive Summary—Redacted

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1.0 Executive Summary

SNC's CCDev 2 plan will significantly mature our Dream Chaser Crew Transportation System concept.
▪ SNC brings entrepreneurial innovation, flexibility, a proven aerospace track record, and strong company commitment to ensure crew and passenger safety.
▪ Rapid development program mitigates risk; accelerates Crew Transportation System (CTS) capability.
▪ Leverages NASA heritage design and proven launch vehicle to deliver a rapidly maturing end-to-end CTS.
▪ Lifting body benefits for crew and cargo include high cross-range, low g reentry, and runway landing.
▪ World-class, integrated human spaceflight team.

Sierra Nevada Corporation (SNC) proposes to advance commercial Crew Transportation System (CTS) development in partnership with NASA for the Commercial Crew Development Round 2 (CCDev2) program. SNC will be the complete system provider; as prime we integrate our partner companies. SNC successfully partnered with NASA in the first CCDev program and exceeded our commitments while demonstrating significant progress maturing design and development of the Dream Chaser (DC) Space System (DCSS) shown docked to the International Space Station (ISS) in ***Figure 1-1***.

Studies of potential commercial transport customers to low Earth orbit (LEO) indicate a strong business case with multiple government, civil, and commercial customers needing orbital and suborbital services. Our DCSS provides NASA with a full ISS crew transportation system that can service these many other markets. SNC has assembled a world-class team that balances proven human spaceflight experts and technology providers with successful entrepreneurial companies and university perspectives. SNC and our partners, Boeing, United Launch Alliance (ULA), Draper Laboratory, United Space Alliance (USA), AdamWorks (AW), Aerojet, MacDonald Dettwiler and Associates (MDA), Special Aerospace Services (SAS), NASA Langley Research Center (LaRC), Virgin Galactic, and the University of Colorado (CU) will develop and deliver our Nation's next safe, reliable, and cost-effective human spacecraft.

SNC has demonstrated long-term human spaceflight commitment through 6 years of DCSS work, using internal funding, an unfunded NASA Space Act Agreement (SAA), and funded CCDev SAA which included SNC funds in excess of the NASA award. As a CCDev NASA partner, our team matured the DC design by completing key tasks and four major milestones involving structures, propulsion, guidance navigation and control (GN&C), reaction control system (RCS), analysis, launch vehicle integration, aerodynamics, avionics, crew systems, thermal protection system (TPS), safety, program planning, and systems engineering. SNC's ability to deliver on an aggressive fixed-price program was demonstrated by completing all milestones on time, under budget, with no adverse comments. Budget saved was reinvested in the DC program for additional work thus increasing NASA's investment value. NASA can have high confidence that SNC will excel at the integrated system level during CCDev2.

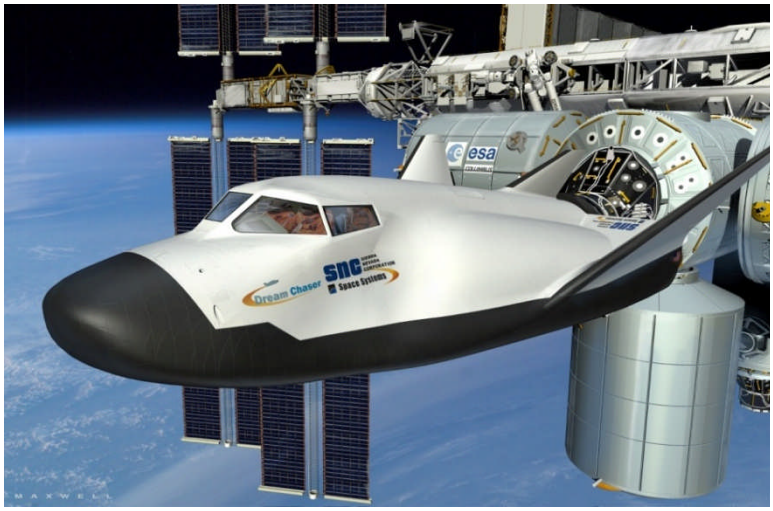

Figure 1-1. SNC Dream Chaser Lifting Body. *Our design transports up to seven crew members and cargo to and from the ISS — safely and reliably.*

Our team is committed to commercial CTS and the DC program. SNC will use internal funds to progress and maintain program continuity during the funding gap. With CCDev2 funding, SNC will complete numerous tasks and 12 major milestones which accelerate commercial CTS, narrowing the

U.S. crew launch capability gap after Shuttle retirement. SNC will again co-invest to accelerate CTS development, testing long-lead hardware and performing early integrated systems analysis to mitigate risks. SNC's CCDev/CCDev2 investment exceeds [redacted] which will make SNC's funding [redacted] of NASA's investment if NASA awards our requested amount. This SNC investment includes more than [redacted] investment by our partner companies. With requested funding, SNC will demonstrate crew transportation to LEO by [redacted].

1.1 Technical Approach

Our development approach maximizes mature technology and heritage design, development, and analysis. The DC heritage lifting body spacecraft launches on a flight-proven launch vehicle and leverages proven ground and mission systems to the extent practical. DCSS is the ideal space system for CTS to LEO. The spacecraft itself is a third-generation design derived from years of extensive LaRC research to provide a reusable, pressurized, lifting-body vehicle that lands on a conventional runway. Lifting bodies have significant technical advantages over capsules for human transport including increased cross-range, lower entry g forces, and runway landings. Our design improves safety and operational flexibility with no black zones during ascent, a better entry environment for crew and science return, and no hazardous post-landing ground support.

The DC retains the HL-20 outer mold line and center of gravity. HL-20 design was refined with 1,200+ LaRC wind tunnel tests, hundreds of piloted flight simulation hours, and five (four orbital) flights of the HL-20 predecessor, the Russian BOR-4. SNC improves the LaRC development work by using new composite structure with modern construction techniques and materials, and an SNC-developed hybrid rocket motor design that was used on SpaceShipOne. The upgraded hybrid rocket motor will perform orbit adjust, deorbit, and abort maneuvers. ***Figure 1-2*** shows the successful CCDev milestone rocket motor test at our Poway test facility.

Every DC mission uses a human-in-the-loop to enhance mission success, safety, and reliability as demonstrated by previous NASA programs. A pilot reduces software needs over a completely autonomous system, enables timely and effective decision-making, and increases ISS docking success probability. Safe, gentle, deconditioned crew return to runway landings may be done automatically or piloted. ULA's Atlas V booster (***Figure 1-3***), an existing, reliable expendable launch vehicle is used to further reduce development time, cost, and risk. ULA engineering analysis confirms the DC/Atlas V configuration feasibility. SNC and ULA are collaboratively refining the integrated stack aerodynamic and structural loads analysis. CCDev2 funding accelerates DCSS integrated design and human rating plan work.

DC will launch from Kennedy Space Center, use onboard propulsion to dock to ISS, and will depart ISS following crew exchange. Analysis to date identifies no time-limited systems, so the DC can remain docked to ISS for extended periods and serve as a crew rescue vehicle. After deorbit burn DC completes entry, descent, and landing at the Shuttle Landing Facility. The non-toxic propellants and design for operability shorten next flight turnaround time.

The SNC program plan advances the DC from preliminary design through orbital flight test. SNC executed the early stages of this plan through internal funding and an unfunded NASA SAA. CCDev funding allowed focused risk reduction on key systems including propulsion, GN&C, and Engineering Test Article (ETA) primary structure. CCDev2 will expand our efforts to a full development program leading to a [redacted] orbital systems Preliminary Design Review (PDR) and

Figure 1-2. Hybrid Rocket Motor Test. *Provides safe, non-toxic propulsion system for aborts, orbit adjust, and deorbit.*

[redacted] ETA atmospheric drop tests. Our team will integrate and outfit the ETA with systems and flight controls, and perform ground tests for the flight test readiness by the end of CCDev2. DCSS Orbital Vehicle (OV) progress will continue with determination of aerodynamic and structural loads and complete vehicle systems definition. Our team will begin fabricating the Structural Test Article (STA), then complete structural and environment testing later in the program. The STA uses the same structure as future orbital vehicles to allow rapid progress through our parallel development design approach. After completing ground testing, the STA will be used for engineering development and crew training. SNC will outfit two extra crew cabin structures, initiated during CCDev, as a simulator and a mockup for human factors and crew accommodations assessment, displays and controls development, and subsystems layout.

Figure 1-3. Dream Chaser/ Atlas V. *Proven safe and reliable booster.*

As a rapid development program, many systems must be matured simultaneously. We will accomplish this through staggered parallel development of the ETA, STA, and Sub-Orbital Vehicle (SOV) airframes, and all vehicle systems. We emphasize critical long-lead GN&C, flight control and propulsion systems and aerodynamic database completion. We capitalize on the extensive capabilities of our partner companies and their proven spacecraft design experience to speed development and reduce DCSS program risk. Examples are Boeing's X-37 spacecraft, Draper's X-38, Aerojet's Shuttle RCS, and USA's Shuttle processing and operations. DC maturation advances the overall crew spacecraft system development in support of a [redacted] orbital flight, and includes significant reduction and mitigation of major risks as shown in foldout ***Table F1***. DCSS maturation is a major CCDev2 thrust as we take overall design toward PDR and complete testing to accelerate our CTS capability to [redacted].

SNC will use our NASA partnership to leverage expertise by inviting NASA insight into all DC development activities. We request that NASA provide personnel in all pertinent development areas to work alongside our team to allow visibility into the work and processes. All SNC work will continue to be completely open to our government partners.

Since the ultimate goal is to provide the complete system to safely transport crew and pressurized cargo to and from LEO and the ISS, our human rating plan and ISS interface requirements development remain integral parts of CCDev2. During CCDev we initiated the human rating plan and completed the ISS interface requirements flow down to the design. During CCDev2 we will mature the human rating plan through integrated system safety and hazard reviews, integrating human rating certification requirements in all aspects of the DCSS.

We will make considerable progress with tangible results during CCDev2. Foldout ***Tables F2 and F3*** define the CCDev 2 milestones, tasks, and associated schedule; demonstrating the NASA investment value to be realized in spacecraft advancement, design maturation, risk reduction, and overall space system accelerated development. A NASA investment of [redacted] enables full ETA development, fabrication, and flight readiness. It matures the DC design and initiates work on the STA, SOV, and all orbital systems. It enables substantial human rating certification work for crew and passenger safety. It allows risk reduction via integrated systems safety and hazard reviews, multiple system ground tests, and [redacted] flight test program initiation. NASA's funding accelerates U.S. CTS capability to [redacted]. If additional funds beyond the [redacted] are available, SNC has identified additional tasks and milestones that further accelerate CTS availability to [redacted]. Should [redacted] not be available, SNC can reduce work commensurate with any funding level awarded. For example, if only [redacted] is available, scope would be reduced for STA, SOV, RCS, and GN&C work. SNC would still make significant progress but CTS capability would not occur in [redacted].

1.2 Business Information

SNC is a proven systems integrator and an electronic systems and space systems provider with a reputation for rapid, innovative, and agile technology solutions. As a 100% U.S., privately held, woman-owned and operated business, SNC has been under the current ownership since 1993. SNC employs a highly talented staff of 2,200+ people. Most are engineers, scientists, or technical personnel. Our seven business areas operate in 20 states. SNC has a very solid financial foundation based on its 2010 predicted revenues of about [redacted], and an uninterrupted profitable growth history with no long-term debt. SNC's strong financial track record and stable leadership structure are a key element in the successful yearly execution of hundreds of government contracts. SNC holds one of the highest possible Dun & Bradstreet rating scores. SNC revenues have grown more than [redacted] yearly on average since 1994 with a consistent average year-over-year revenue growth of [redacted] for the past 6 years. SNC has continued this growth without sacrifice to the profit margin. In conjunction with a healthy balance sheet and income statement, SNC has access to a [redacted] available line of credit from a syndicate of top-tier U.S. banks.

The SNC team has invested a substantial amount of capital, engineering, time and effort to develop the technologies that support our DC spacecraft. These technologies and expertise include hybrid propulsion systems, complex composite structures, airframe design, spacecraft components, adapter rings, navigation and control, life support, and integrated system design and testing capabilities. This previous work and our continuing NASA partnership will significantly lower development time and risk, and will help to ensure program success.

Figure 1-4 shows the world-class team of spaceflight experienced partners assembled to execute CCDev2 and the full program. Our CCDev partners continue as team members, and are joined by others as our scope expands. Boeing has great expertise in lifting body spacecraft including analysis, avionics, GN&C, software, and flight control. Their recent X-37 spacecraft experience fits perfectly with our DC development and risk reduction activities. ULA has been on our team for more than 4 years; jointly collaborating on an integrated launch vehicle (LV) stack that rapidly brings a safe, reliable, and cost-effective commercial CTS to the LEO market. ULA will assist SNC with integrated aerodynamics and risk retirement. Aerojet, a propulsion leader, will develop the main RCS. Draper Lab, with unparalleled GN&C experience, will lead orbital GN&C development. NASA LaRC adds expertise in HL-20 analysis and modeling. AdamWorks will assist SNC in structural fabrication using our combined composite manufacturing capabilities. CU will conduct displays and controls layout and evaluations and refine the integrated system Human Rating Plan, with assistance from SAS. The U.S. component of MDA will provide launch vehicle structural interface, communication and separation systems, and systems engineering services. USA will use their extensive Shuttle experience to provide operations and software development support. SNC and Virgin Galactic are working together to plan for global marketing, sales, and commercial operation of the orbital DC. In addition to coordinating and managing the team, SNC will manage all internal systems, propulsion, structure, LV integration, and systems engineering.

Figure 1-4. DC Team. *SNC provides a world-class team.*

1.3 Eligibility

SNC is an entity organized under the laws of the United States and is more than 50% owned by U.S. nationals; therefore we are eligible to submit a proposal under the provisions of Section 4.2 of the Commercial Crew Development Round 2 Announcement No. NASA-CCDev-2.

CCDev2 Roadmap. *Program risks, tasks, and milestones are actively coordinated as part of the Program Plan.*

Table F1. Top CCDev2 Risks. Programmatic and technical risks will continue to be reviewed, mitigated, and tracked.

Risk #	Risk Name & Description
R1	**Margins Management (Mass/CG/Volume/Power/Thermal)** - System level design could exceed SRD-derived limits/constraints, requiring redesign.
R2	**DC/Atlas V Integration** - Atlas V-DC architecture may not provide sufficient mass to orbit, or may not provide sufficient abort effectiveness.
R3	**Avionics &Software Development Maturity** - Avionics and software may not be mature for flight tests.
R4	**Insufficient Budget/Schedule** - Without full NASA funding the NASA/SNC budget may be insufficient to execute CCDev2 as planned, or to accelerate CTS capability.
R5	**Requirements Uncertainty** - Uncertainty of NASA certification requirements may cause late changes, impacting cost and schedule.
R6	**Aerodynamics/Vehicle Controllability** - Improper airfoil fin design, lack of Aero Database fidelity/validation, and/or control surface issues may require redesign.
R7	**Business Case** - Commercial Crew services requires additional markets and marketing to close business case.
R8	**DC Hybrid Motor Thrust Asymmetry** - Motor thrust asymmetry could result in controllability issues during flight.
R9	**Orbital MMOD Susceptibility** - Vulnerability to MMOD may cause loss of mission.
R10	**RCS Development** - RCS TRL may not progress adequately to meet scheduled performance requirements.
R11	**Thermal Protection System** - TPS may not have sufficient capability to cover nominal entry and certified aborts.

Table F2. CCDev2 Program Milestones. Twelve milestones will assist in mitigating risk during the CCDev2 program.

Milestone #	Milestone Name	Date	Risks Addressed
M1	Program Implementation Plan Delivery	Apr 2011	R4 R5
M2	Canted Airfoil Fin Selection	May 2011	R2 R6 R10
M3	Flight Simulator Integration into Cockpit Mockup	June 2011	R1 R3 R6
M4	Engineering Mockup Completion	July 2011	R1 R5
M5	Vehicle Avionics Integration Laboratory	Aug 2011	R1 R3 R5
M6	Flight Control Integration Laboratory	Sep 2011	R1 R3 R6
M7	ETA Structure Delivery	Nov 2011	R1 R2 R6 R10
M8	Separation System Test	Jan 2012	R1 R2 R6
M9	Captive Carry Interface Test	Feb 2012	R1 R6
M10	ETA Landing Gear Drop Test	Feb 2012	R1 R6
M11	Main RCS Test	Mar 2012	R1 R10
M12	ETA Test Flight Readiness Review	May 2012	R1 R3 R4 R5 R6

Table F3. CCDev2 Tasks and Schedule. Completing these tasks will also serve to move the associated risks toward mitigation.

IPT	CCDev2 Task Name	Risks Addressed	Milestones Reference
Program Management	Initiate Full Program Plan, Update Program Implementation Plan	ALL	M1
Program Management	Refine Business Plan	R4,R7	
Program Management	Conduct Program Reviews including Updates, Milestone Completion Reviews, and ETA Flight Readiness Review	ALL	M12
S&MA	Mature Integrated DCSS Human Rating Certification Plan, Initiate fault tolerance and reliability analysis	R1-6, R-10	
S&MA	Staff SNC S&MA organization	ALL	
All	Define systems architecture for ETA/SOV/OV , complete system-level specifications	R1-6, R-10	
Avionics, Comm, Crew Sys, EPS, ECLSS, GN&C	Procure, install and test ETA hardware and software	R1, R3-6	M12
Systems Engineering	Assess DC design against NASA requirements and draft requirements	R1-3, R5-6, R-10	
Systems Engineering	Coordinate Reviews including System Requirements Review and System Definition Review, Prepare for Preliminary Design Review	R1-3, R5-6, R-10	
Avionics	Select initial displays/controls and evaluate human factors	R1, R3-5	
Avionics	Establish avionics integration test bed VAIL, perform hardware in the loop integration, Integration of ETA software into the VAIL	R1, R3-5	M5
Crew Systems	Complete crew station mockup, systems layout, human factors evaluations	R1, R4-5	M4
EPS	Integrate EPS into VAIL	R1, R3, R5	
ECLSS	Select ECLSS team member company	R1, R3, R5	
Flight Performance	Complete aero database with CFD analysis and wind tunnel testing , Continue nominal and abort trajectories, loads, canted fin airfoil shape and aerothermal heating analysis	R1-2, R4, R6, R8	M2, M12
Flight Performance	Select fin shape	R1, R6	M2
GN&C	Initiate ETA flight control hardware testing in the Flight Control Integration Lab	R1, R3-6	M6
GN&C	Mature cockpit flight simulator for engineering and pilot evaluations and ETA pilot training	R3-6	M3
GN&C	Initiate auto land algorithm and equipment development	R1, R3-6	
Launch Vehicle Integration	Complete wind tunnel testing for combined vehicle buffet and force & moment tests	R1-2, R4, R6	
Launch Vehicle Integration	Design of reinforcement/sleeve of Centaur, Define emergency detection system ICD for DC to Atlas V and DC to ground systems	R1-2, R4, R6	
Launch Vehicle Integration	Design and functional testing of separation system	R1-2, R4, R6	M8
Launch Vehicle Integration	Continue assessing viability of other launch vehicles as risk mitigation	R2, R4, R5, R7	
Main Propulsion System	Build and test motor with flight-like configuration, casings and igniters	R1-2, R4, R6, R8	
Main Propulsion System	Complete thrust vector control trade, design and build hardware for testing	R1-2, R4, R6, R8	
RCS	Build and ground test flight-like RCS jets	R1, R3-4, R6, R10	M11
RCS	Initiate fluid analytical modeling	R1, R3, R6, R10	
Software	Complete flight and ground software architecture to support SOV and OV systems	R3-5	
Software	Select flight software development team company	R3-5	
Structures & Mechanisms	Complete ETA structure and secondary structure to support drop test flights and systems installation	R1, R4-6	M7
Structures & Mechanisms	Design, build and test the drop aircraft release mechanism	R1, R4-6	M9
Structures & Mechanisms	Evaluate ETA landing gear dynamic limit loads and landing load attenuation capability	R1. R4	M10
Structures & Mechanisms	Initiate STA/OV primary structure and aeroshell design, Fabricate high temperature tooling for OV configuration, Initiate STA fabrication	R1, R4-5	
Thermal Control System	Analyze integrated thermal loads, Complete preliminary thermal control system analysis for OV	R1, R5, R6, R9	
TPS	Integrate updated DC trajectories and environments for better fidelity to the peak heat loads and rates to complete TPS material trade study	R1, R6, R9	
TPS	Initiate aerothermal wind tunnel testing of leading edge TPS	R1, R6, R9	
Manufacturing & Integration	Outfit assembly facility	R4, R7	
Manufacturing & Integration	Complete ETA assembly and outfitting	R1, R3-6	
Manufacturing & Integration	Perform ETA integrated tests and subsystem ground validation test	R1, R3-6	M12
Operations	Develop ETA flight test processing plan and Flight Test Plan, Mature and prepare ETA ground and flight test infrastructure, Initiate preliminary OV mission and ground systems design	R1, R3-7	M12
Operations	Train ETA flight crew	R6	M12

Appendix 2: (Revised with Optional Milestones) Performance Milestones and Success Criteria (Based on April, 2011 Contract Award)

Appendix 2(a). CCDev2 Performance Milestones and Success Criteria.		
Baseline Milestones	**Milestone Value**	**Baseline $80M Award Schedule**
Milestone 1: System Requirements Review **Description:** Conduct System Requirements Review (SRR); SNC shall present a briefing of the system requirements for the Dream Chaser Space System (DCSS). SNC shall provide NASA a hard copy of the presentation materials and responses to NASA questions concerning system requirements. **Success Criteria:** Meet criteria specified in the SNC System Requirements Review Entrance and Success Criteria. (Table 1)	$12.5M	May 2011
Milestone 2: Canted Airfoil Fin Selection **Description:** Complete wind tunnel tests and Computational Fluid Dynamics (CFD) analysis on candidate airfoil fin Outer Mold Line (OML) and select final fin shape to ensure proper aerodynamic performance of fins. Present analysis results and final DC airfoil shape to NASA. **Success Criteria:** Completion of the review of the airfoil selection as described above. (Table 2)	$2.5M	June 2011
Milestone 3: Cockpit Based Flight Simulator **Description:** Complete fabrication and assembly of cockpit structure, install simulator displays and controls, and conduct a Simulator Readiness Review to verify readiness for engineering and pilot evaluations. **Success Criteria:** Meet the criteria specified in the SNC Simulator Readiness Review Entrance and Success Criteria. The DC cockpit structure is completed, simulator hardware integrated, and the simulator is ready for engineering simulations. (Table 3)	$5M	July 2011
Milestone 4: Vehicle Avionics Integration Laboratory **Description:** Vehicle Avionics Integration Laboratory (VAIL) designed and ready to begin DC avionics developmental engineering tests. VAIL will allow testing, verification and validation of avionics and software. **Success Criteria:** Demonstration of a functional VAIL, which is ready for avionics bench testing. (Table 4)	$10M	September 2011
Milestone 5: System Definition Review **Description:** Conduct System Definition Review (SDR); SNC shall present a briefing of the proposed Dream Chaser Space System architecture/design. SNC shall provide NASA a hard copy of the presentation materials and responses to NASA questions concerning system definition. **Success Criteria:** Meet criteria specified in the SNC System Definition Review Entrance and Success Criteria. (Table 5)	$12.5M	October 2011

Appendix 2(a). CCDev2 Performance Milestones and Success Criteria.		
Baseline Milestones	**Milestone Value**	**Baseline $80M Award Schedule**
Milestone 6: Flight Control Integration Laboratory **Description:** Flight Control Integration Laboratory designed, developed and ready to begin developmental engineering tests of flight control actuators and surfaces. Complete assembly of the Flight Control Bench Test hardware such that it is ready to support ETA flight control tests. **Success Criteria:** Demonstration of a functional Flight Control Integration Laboratory which is ready for flight control bench testing. (Table 6)	$7.5M	November 2011
Milestone 7: ETA Structure Delivery **Description:** Complete assembly of and deliver the ETA primary structure for start of system integration and installation of secondary structure. **Success Criteria:** Assembly and delivery of the ETA primary structure; ready for system integration. (Table 7)	$12.5M	December 2011
Milestone 8: Separation System Test **Description:** Complete design and construction of prototype DC separation system and demonstrate activation to validate concept and verify performance of separation system. **Success Criteria:** Demonstration of the DC prototype separation system test as described in the test plan. (Table 8)	$5M	February 2012
Milestone 9: Preliminary Design Review **Description:** Conduct Preliminary Design Review (PDR). SNC shall present a briefing of the preliminary Dream Chaser design. SNC shall provide NASA a hard copy of the presentation materials and responses to NASA questions concerning system preliminary design. **Success Criteria:** Meet criteria specified in the SNC Preliminary Design Review Entrance and Success Criteria. (Table 9)	$12.5M	May 2012

Appendix 2(b). CCDev2 Optional Performance Milestones and Success Criteria.		
Optional Milestone	**Milestone Value**	**Increased Award Schedule**
Optional Milestone 10: Perform Materials Testing **Description:** Perform MMOD hypervelocity impact testing on selected TPS and composite materials to characterize damage tolerance. **Success Criteria:** Completion of TPS and composite MMOD hypervelocity impact testing as outlined in the test plan. (Table 10)	[redacted]	Optional December 2011
Milestone 11: Captive Carry Interface and ETA Landing Gear Drop Tests **Description:** Complete fabrication of ETA captive carry prototype interface mechanism. Perform integrated test of interface mechanism and perform release test to verify performance of system to ensure readiness for captive carry. Perform drop test of ETA landing gear to evaluate landing gear dynamic limit loads and landing load attenuation capability to ensure adequate performance of landing gear. **Success Criteria:** Completion of ETA captive carry mechanism interface test and demonstrate release mechanism functionality as outlined in test plan. Completion of ground drop test of ETA landing gear as outlined in the test plan. (Table 11)	[redacted]	Optional January 2012
Optional Milestone 12: ETA Captive Carry Flight Test **Description:** Conduct ETA captive carry flight test on carrier aircraft to characterize integrated vehicle performance. **Success Criteria:** Completion of ETA captive carry flight as outlined per the flight test plan. (Table 12)	[redacted]	Optional February 2012
Optional Milestone 13: Wind Tunnel Testing **Description:** Conduct integrated launch vehicle stack buffet, force and moment wind tunnel testing. **Success Criteria:** Completion of wind tunnel testing as outlined per the SNC/ULA integrated wind tunnel test plan. (Table 13)	[redacted]	Optional March 2012
Optional Milestone 14: Dream Chaser Handling Qualities Evaluation **Description:** Acquire and modify Dream Chaser Training Aircraft (DCTA) to allow simulation of Dream Chaser subsonic flight. Perform approach and landing handling qualities evaluation in the DCTA. **Success Criteria:** Completion of approach and landing handling qualities evaluation per standard Cooper-Harper metrics. (Table 14)	[redacted]	Optional March 2012
Milestone 15: Main RCS Test **Description:** Complete fabrication and test of a full scale development RCS thruster to verify performance. **Success Criteria:** Firing of development RCS thruster for a duration that represents an RCS down-mode deorbit burn capability. (Table 15)	[redacted]	Optional April 2012
Optional Milestone 16: Two Hybrid Rocket Motor Test Firing **Description:** Manufacture of and dual ground based motor firings of two Dream Chaser hybrid rocket motors will be demonstrated. **Success Criteria:** Completion of Dream Chaser hybrid rocket motors ground test that demonstrates dual motor operation per the test plan. (Table 16)	[redacted]	Optional May 2012
Optional Milestone 17: Thrust Vector Control Test **Description:** Manufacture of and test of representative Thrust Vector Control (TVC) system for the Dream Chaser hybrid rocket motor. TVC test will be conducted with a demonstration motor firing. **Success Criteria:** Completion of TVC test as outlined in the test plan. (Table 17)	[redacted]	Optional May 2012

Appendix 2(b). CCDev2 Optional Performance Milestones and Success Criteria.		
Optional Milestone	**Milestone Value**	**Increased Award Schedule**
Milestone 18: ETA Captive Carry Flight Test Readiness Review **Description:** Complete Captive Carry Flight Test Readiness Review to verify ETA readiness for captive carry testing. SNC shall provide briefing of the Flight Test Plan and ETA vehicle captive carry test readiness and a hard copy of the presentation materials and responses to NASA questions concerning captive carry test readiness. **Success Criteria:** Meet criteria specified in the SNC Captive Carry Flight Test Readiness Review Entrance and Success Criteria. (Table 18)	[redacted]	Optional May 2012
Optional Milestone 19: ETA Free Flight Test **Description:** Conduct piloted ETA Free Flight test from carrier aircraft to characterize handling qualities and approach and landing. **Success Criteria:** Completion of ETA Free Flight as outlined per the flight test plan. (Table 19)	[redacted]	Optional May 2012

Table 1: CCDev2 SNC Milestone #1
System Requirement Review
Entrance and Success Criteria
(Derived from NASA NPR 7123.1A, G.4)

Table 1. System Requirements Review Entrance and Success Criteria.	
DCSS SRR Entrance Criteria	**DCSS SRR Success Criteria**
1. High-level Program requirements have been defined that support mission objectives. 2. An approach for verifying compliance with program requirements has been defined. 3. Procedures for controlling changes to program requirements have been defined and approved. 4. RID process defined and review team trained in preparation for document review. 5. Top Program risks with significant technical, safety, cost, and schedule impacts are identified via the Risk Management Plan (RMP). 6. The following DCSS Program documentation is available to review: a. Design Reference Document (DRD) b. System Requirements Document (SRD) c. Concept of Operations (ConOps) Document d. Design Reference Mission (DRM) Document e. Systems Engineering Management Plan (SEMP) f. Configuration Management Plan (CMP) g. Human Rating Certification (HRC) Plan h. Safety & Mission Assurance (S&MA) Plan i. RMP j. System Analysis Plan	1. The Program utilizes an approved approach as defined in the SEMP to allocate and control Program requirements. 2. Established the preliminary DCSS architectural baseline, as described in the DRD. 3. Established requirements, which meet the mission as defined in the DRM, are baselined in the SRD. 4. Program risks and opportunities are understood and have been assessed by Program Boards; acceptable risk mitigation plans developed, where applicable. 5. The preliminary approach for determining how requirements are verified and validated is described in the SEMP. 6. Defined path toward System Definition Review (SDR), including interim milestones, analysis plan and entrance/exit criteria is provided.

Table 2: CCDev2 SNC Milestone #2
Canted Airfoil Fin Selection
Entrance and Success Criteria

Table 2. Canted Airfoil Fin Entrance and Success Criteria (Airfoil Fin Selection).	
Entrance Criteria	**Success Criteria**
1. Complete wind tunnel tests on candidate airfoil fin outer mold lines (OML) and provide test results. 2. Complete CFD and analysis of candidate airfoil fin OMLs to predict performance of fins and provide analysis results. 3. Complete trade study of candidate fins and provide trade study results and final fin selection. 4. Technical data package, as described below, is complete. a. Wind Tunnel Test Results b. CFD Analysis Results c. Trade Study Results	1. Required tests and analyses are complete and indicate that the system will perform properly in the expected operational environment. 2. Final airfoil fin OML defined, and approved by DC Program Management. 3. Test and analysis results are documented and provided.

Table 3: CCDev2 SNC Milestone #3
Cockpit Based Flight Simulator
Entrance and Success Criteria

Table 3. Cockpit Based Flight Simulator Entrance and Success Criteria.	
Entrance Criteria	**Success Criteria**
1. The Dream Chaser cockpit structure is completed with simulator hardware integrated.	1. Required tests and analyses are complete and indicate that the system will perform properly: a. Execution of a flight simulation which demonstrates the Cockpit Flight Simulator capability to simulate Dream Chaser flight characteristics.
2. The cockpit flight simulator is ready for engineering evaluations.	2. System meets the SNC established acceptance criteria. a. Simulator hardware is physically integrated into cockpit structure. b. Representative ETA Displays and Controls are installed and fully functional. c. Physical cockpit layout is representative of ETA configuration as defined by the DC ETA Architecture Definition Document.
3. A preliminary Cockpit Flight Simulator Readiness Review agenda is coordinated with NASA prior to the review.	3. Simulator activation and operations procedures are completed and validated.
4. The following Cockpit Simulator Readiness Review technical products have been made available to NASA prior to the review: a. Acceptance Package for the major components. b. Technical data package as updated to include all test results. c. Remaining liens or unclosed actions and plans for closure.	4. Simulator data package is complete and ready for use and placed under Dream Chaser program configuration control.

Table 4: CCDev2 SNC Milestone #4
Vehicle Avionics Integration Laboratory
Entrance and Success Criteria

Table 4. Vehicle Avionics Integration Laboratory (VAIL) Entrance and Success Criteria.	
Entrance Criteria	**Success Criteria**
1. The Dream Chaser Vehicle Avionics Integration Laboratory (VAIL) is established with initial hardware and software integrated. 2. A preliminary VAIL Readiness Review completed. 3. The following VAIL Readiness Review technical products have been made available to NASA prior to the review: a. Acceptance Package for the major components. b. Technical data package as updated to include all test results. c. Remaining liens or unclosed actions and plans for closure.	1. Initial tests and analyses are complete and indicate that the VAIL will perform properly. 2. Initial VAIL hardware is physically integrated into the laboratory. 3. VAIL activation and operations procedures are completed and validated. 4. VAIL data package is complete and ready for use and placed under Dream Chaser program configuration control.

Table 5: CCDev2 SNC Milestone #5
System Definition Review
Entrance and Success Criteria
(Derived from NASA NPR 7123.1A, G.6)

Table 5. System Definition Review Entrance and Success Criteria.	
DCSS SDR Entrance Criteria	**DCSS SDR Success Criteria**
1. Completion of the SRR and responses made to all SRR RIDs, or a timely closure plan exists for those remaining open. 2. Documentation in place that reflects the proposed system architecture/design, including the flow down to all functional elements. 3. DCSS SDR technical products listed below for both hardware and software system elements have been made available: a. System architecture description including vehicle configuration b. DRD describing the system solution definition c. Updated applicable baselined documentation d. Description of system software functionality e. Technology Maturation Plan f. Software Development Plan g. Software Quality Assurance Plan h. Updated risk assessment and mitigations including threats and opportunities i. Updated schedule data j. Preliminary Interface Requirements Documents (IRD) k. Functional Integrated Safety Analysis l. Preliminary Functional Hazard Analysis	1. The requirements are traceable to the proposed conceptual design, as described in the DRD. 2. The SRD requirements are allocated and flowed down to subsystems. 3. The requirements management tool is in place. 4. Significant development, mission, and safety risks are identified and technically assessed via the process detailed in the updated RMP. 5. The proposed concept in the ConOps is consistent with the DRM. 6. Defined path toward PDR, including interim milestones, analysis plan and entrance/exit criteria is provided. 7. Resources other than budget are adequate and available.

Table 6: CCDev2 SNC Milestone #6
Flight Control Integration Laboratory (FCIL)
Entrance and Success Criteria

Table 6. Flight Control Integration Laboratory Entrance and Success Criteria.	
Entrance Criteria	**Success Criteria**
1. The Dream Chaser Flight Control Integration Laboratory (FCIL) is established with initial hardware and software integrated. 2. A preliminary FCIL Readiness Review completed. 3. The following FCIL Readiness Review technical products have been made available to NASA prior to the review: a. Acceptance Package for the major components. b. Technical data package as updated to include all test results c. Remaining liens or unclosed actions and plans for closure.	1. Initial tests and analyses are complete and indicate that the FCIL will perform properly. 2. Initial FCIL hardware is physically integrated into the laboratory. 3. FCIL activation and operations procedures are completed and validated. 4. FCIL data package is complete and ready for use and placed under Dream Chaser program configuration control.

Table 7: CCDev2 SNC Milestone #7
ETA Structural Delivery
Entrance and Success Criteria

Table 7. ETA Structural Delivery Entrance and Success Criteria.	
Entrance Criteria	**Success Criteria**
1. Receive certification from SNC Management that ETA primary structure is ready for system integration and installation of the secondary structure. 2. Confirm that the ETA primary structure was built within specification and is ready for delivery. a. Open items and waivers have been examined and found to be acceptable.	1. The ETA primary structure is delivered and ready to support installation of subsystem and secondary structure.

Table 8: CCDev2 SNC Milestone #8
Separation System Test
Entrance and Success Criteria

Table 8. Separation System Test Entrance and Success Criteria.	
Entrance Criteria	**Success Criteria**
1. Fabrication and delivery of the prototype separation system test hardware. 2. Receive certification from SNC Management that prototype DC separation system was designed and constructed per specification. 3. Confirm that the separation test plan has been completed and approved by SNC Management; test plan provided to NASA. 4. A Test Readiness Review completed, including a review of test procedures and equipment. 5. The following Test Readiness Review technical products have been made available to NASA prior to the review: a. Acceptance Package for the major components. b. Technical data package as updated to include all test results. c. Remaining liens or unclosed actions and plans for closure.	1. The DC separation test was completed per the test plan. 2. Performance of the separation system was demonstrated to meet test objectives.

Table 9: CCDev2 SNC Milestone #9
Preliminary Design Review
Entrance and Success Criteria
(Derived from NASA NPR 7123.1A, G.7)

Table 9. Preliminary Design Review Entrance and Success Criteria.	
DC PDR Entrance Criteria	**DC PDR Success Criteria**
1. Completion of the SDR responses made to all SDR RIDs, or a timely closure plan exists for those remaining open. 2. Updated documentation in place that reflects the proposed system architecture/design, including the flow down to all functional elements. 3 PDR technical products listed below for both hardware and software system elements have been made available. a. Updated baseline documentation; b. Preliminary subsystem design specifications; c. The preliminary software design specification including the software architecture; d. Updated risk assessment and mitigations including threats and opportunities; e. Updated schedule data; f. Technical plans including EMI/EMC control plan, manufacturability program plan, reliability program plan, quality assurance plan; g. Engineering drawing tree; h. Interface Control Documents (ICDs); i. Complete verification/validation plan; j. Preliminary safety analyses and plans; and k. System-level safety analyses and plans.	1. The top-level requirements are finalized in the SRD and consistent with the preliminary design described in the DRD. 2. The flow down of requirements is complete; an adequate plan exists for resolution of open items. Requirements are traceable to SRD. 3. Technical interfaces are defined. Initial release of ICDs developed from released SDR IRDs. 4. Technical margins exist with DC Program Management-approved forward action plans for open work. 5. Program risks are understood and are being addressed as defined by the RMP. 6. Safety and mission assurance products have been addressed in preliminary designs and any applicable S&MA products have been approved by DC Program Management. 7. Resources other than budget are adequate and available.

Table 10: Optional CCDev2 SNC Milestone #10
Perform Material Testing
Entrance and Success Criteria

Table 10. Material Testing Entrance and Success Criteria .	
Entrance Criteria	**Success Criteria**
1. Fabrication and delivery of composite materials and Thermal Protection System (TPS) test samples. 2. Receive certification from SNC Management that composite material and TPS testing is ready to proceed. 3. Confirm that the SNC MMOD hyper-velocity impact test plan has been completed and approved by SNC Management and provided to NASA. 4. A Test Readiness Review completed, including a review of test procedures and equipment.	1. The MMOD hypervelocity impact testing was completed per the test plan. 2. Initial test results provided.

Table 11: Optional CCDev2 SNC Milestone #11
Captive Carry Interface and ETA Landing Gear Drop Test
Entrance and Success Criteria

Table 11. Captive Carry Interface and ETA Landing Gear Drop Test Entrance and Success Criteria.	
Entrance Criteria	**Success Criteria**
1. Fabrication and delivery of the ETA captive carry interface test and landing gear drop test hardware. 2. Receive certification from SNC Management that prototype ETA captive carry interface test and landing gear drop test hardware were designed and constructed per specification. 3. Confirm that the ETA captive carry interface test and landing gear drop test plans have been completed and approved by SNC Management; test plans provided to NASA. 4. Test Readiness Reviews completed, including reviews of test procedures and equipment. 5. The following Test Readiness Reviews technical products have been made available to NASA prior to the reviews: a. Acceptance Packages for the major components. b. Technical data packages as updated to include all test results. c. Remaining liens or unclosed actions and plans for closure.	1. The ETA captive carry mechanism interface test was completed per the test plan, and demonstrated release system functionality. 2. Ground drop test of ETA landing gear was completed per the test plan. 3. Performance of both systems was demonstrated to meet test objectives.

Table 12: Optional CCDev2 SNC Milestone #12
ETA Captive Carry Flight Test
Entrance and Success Criteria

Table 12. ETA Captive Carry Flight Test Entrance and Success Criteria.	
Entrance Criteria	**Success Criteria**
1. Completed the Captive Carry Flight Test Readiness Review. 2. Receive certification from SNC Management that integrated flight operations, including both the ETA and carrier vehicle, can safely proceed. 3. Confirm that the ETA and carrier vehicle systems and support elements are properly configured and ready for captive carry flight. 4. Completion of the carrier vehicle pilot briefing. 5. Confirm that the captive carry flight test plans have been updated, if required.	1. The ETA Captive Carry Flight Test was conducted per the test plan.

Table 13: Optional CCDev2 SNC Milestone #13
Wind Tunnel Testing
Entrance and Success Criteria

Table 13. Wind Tunnel Testing Entrance and Success Criteria.	
Entrance Criteria	**Success Criteria**
1. Fabrication and delivery of the wind tunnel models. 2. Instrumentation installation complete and wind tunnel models ready for testing. 3. Receive certification from SNC Management that wind tunnel testing is ready to proceed. 4. Confirm that the SNC/ULA wind tunnel test plans have been completed and approved by SNC Management. 5. Test Readiness Reviews completed, including a review of test procedures and equipment. 6. The following Test Readiness Review technical products have been made available to NASA prior to the review: a. Acceptance Package for the major components. b. Technical data package as updated to include all test results. c. Remaining liens or unclosed actions and plans for closure.	1. The buffet and force and moment wind tunnel testing was completed per the test plans. 2. Initial test results provided.

Table 14: Optional CCDev2 SNC Milestone #14
Dream Chaser Handling Qualities Evaluation
Entrance and Success Criteria

Table 14. Dream Chaser Handling Qualities Evaluation Entrance and Success Criteria.	
Entrance Criteria	**Success Criteria**
1. Obtain and modify the DC training aircraft. 2. Receive certification from SNC Management that the modifications to the training aircraft effectively simulate Dream Chaser subsonic flight. 3. Confirm that the Approach and Landing Handling Qualities Evaluation Test Plans have been completed and approved by SNC Management. 4. A Flight Test Readiness Review completed, including a review of test procedures and equipment.	1. Completion of approach and landing handling qualities testing and evaluation, per Cooper-Harper metrics. 2. Initial test results provided.

Table 15: Optional CCDev2 SNC Milestone #15
Main RCS Test
Entrance and Success Criteria

Table 15. Main RCS Test Entrance and Success Criteria.	
Entrance Criteria	**Success Criteria**
1. Receive certification from SNC Management that fabrication of full scale development RCS thruster designed and constructed to specification. 2. Confirm that the RCS Test Plan has been completed and approved by SNC Management; test plan provided to NASA. 3. Completed Test Readiness Review, including a safety review and a review of test procedures and equipment. 4. The following Test Readiness Review technical products have been made available to NASA prior to the reviews: a. Acceptance Package for the major components. b. Technical data package as updated to include all test results. c. Remaining liens or unclosed actions and plans for closure.	1. A demonstration of a representative RCS thruster was completed per the test plan. 2. Performance was demonstrated to meet test objectives.

Table 16: Optional CCDev2 SNC Milestone #16
Two Hybrid Rocket Motor Test Firing
Entrance and Success Criteria

Table 16. Two Hybrid Motor Test Firing Entrance and Success Criteria.	
Entrance Criteria	**Success Criteria**
1. Fabrication and delivery of two hybrid rocket motors. 2. Completed fabrication of the test stand. 3. Receive certification from SNC Management that hybrid rocket motors and the dual ground-based hybrid rocket motor test stand were designed and constructed per specification. 4. Confirm that the Dual Hybrid Motor Test Plan has been completed and approved by SNC Management; test plan provided to NASA. 5. Completed Test Readiness Review, including a safety review and a review of test procedures, equipment and test stand.	1. Completion of the Dream Chaser Dual Hybrid Rocket Motor Ground Test that demonstrates motor operation per the test plan.

Table 17: Optional CCDev2 SNC Milestone #17
Thrust Vector Control Test
Entrance and Success Criteria

Table 17. Thrust Vector Control Test Entrance and Success Criteria.	
Entrance Criteria	**Success Criteria**
1. Fabrication and delivery of the representative Thrust Vector Control (TVC) hardware and demonstration motor. 2. Receive certification from SNC Management that the representative TVC system was designed and constructed per specification. 3. Confirm that the TVC Test Plan has been completed and approved by SNC Management. 4. Completed Test Readiness Review, including a review of test procedures and equipment.	1. Completion of the DC representative TVC system test, per the test plan.

Table 18: Optional CCDev2 SNC Milestone #18
ETA Captive Carry Flight Test Readiness Review
Entrance and Success Criteria
(Derived from NASA NPR 7123.1A)

Table 18. ETA Captive Carry Flight Test Readiness Review Entrance and Success Criteria.	
Entrance Criteria	**Success Criteria**
1. Receive certification from SNC Management that flight operations can safely proceed with acceptable risk. 2. Captive carry flight test safety plan complete; all open safety and mission risk items have been addressed. 3. Confirm that the system and support elements are properly configured and ready for captive carry flight. 4. Establish that all interfaces are compatible and function as expected: a. ETA captive carrier mechanical interface verification. b. Ground Systems to ETA interface verification. 5. The DC Program Management approved ETA Captive Carry Flight Test Plan and it was provided to NASA.	1. The ETA Flight Test Vehicle is ready for captive carry flight testing. 2. The DC Program Management is go for ETA captive carry flight testing.

Table 19: Optional CCDev2 SNC Milestone #19
ETA Free Flight Test
Entrance and Success Criteria

Table 19. ETA Free Flight Test Entrance and Success Criteria.	
Entrance Criteria	**Success Criteria**
1. ETA Free Flight Test Readiness Review completed, including a review of test procedures and equipment. 2. Receive certification from SNC Management that integrated flight operations, including both the DC ETA and carrier vehicle, can safely proceed with acceptable risk. 3. Confirm that the ETA and carrier vehicle systems and support elements are properly configured and ready for free flight. 4. Completion of the pilots' briefing.	1. The ETA Free Flight Test was conducted per the test plan.